DETAILED ACTION

This office action is a response to Applicant's amendment submitted June 13, 2006, wherein claim 1 is amended. Applicant's declaration of Dr. Lee, Sang-koo submitted December 18, 2009 under 37 CFR 1.132, is acknowledged and will be further discussed below.

Claims 1-6, 15, and 18-21 are pending and are examined on the merits herein.

In view of the declaration of Dr. Lee, Sang-Koo submitted December 18, 2009, the objection to the specification for new matter is withdrawn.

In view of Applicant's amendment submitted December 18, 2009, the rejection of claims 1-6, 15, and 18-20 under 35 U.S.C. 112, second paragraph, as being indefinite with respect to the filtering step is withdrawn.

In view of Applicant's amendment and remarks submitted December 18, 2009, the rejection of claims 1-6, 15, and 18-20 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement is withdrawn.

The following rejections are maintained:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-6, 15, and 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Onda et al. (US 4,091,205, May 23, 1978, PTO-1449 submitted June 13, 2006) and Haidasch et al. (US 3,251,825, May 17, 1986, of record) in view of Richter (US 2,090,808, August 24, 1937, of record), Dannhorn et al. (US 2002/0038018, March 28, 2002, PTO-892), and Anderson et al. (US 2,647,064, July 28, 1953, of record).

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Onda teaches a process for preparation of low-substituted cellulose ethers starting from wood pulp [see abstract]. The method for the etherification step is conventional, including reaction with an alkyl chloride or alkylene oxide at a temperature from 20-90°C [column 2, lines 25-31]. 100 parts of alkali cellulose formed with sodium hydroxide was placed into a reaction vessel and 15 parts methyl chloride was added. Etherification was carried out using 15 parts of methyl chloride using stepwise elevation

of temperature: 40°C for 2 hours, 50°C for 1 hour, and 80°C for 1 hour [column 6, Example 2]. In another example, alkali cellulose was reacted with 10.5 parts propylene oxide at 40°C for 1 hour, 50°C for 1 hour, and 70°C for 1 hour [column 4, Example 1]. The fibrous product was washed with water, filtered, then pulverized to form a fine powder, having a particle distribution rate of 0-1.5% for particles of coarser than 100 mesh and loose bulk density of 48-55 g/ml [column 6, Table III].

Onda does not teach a method starting from pulverized cellulose and the second step of Onda's process is carried out at 50°C compared to the 55-65°C required by claim 2.

Haidasch teaches a process for the preparation of mixed cellulose allyl ethers, comprising reaction of alkali cellulose with a low alkyl halide, a low oxalkylating agent and an allyl halide, simultaneously or in any order desired, at raised temperature, and in the presence of organic solvent [column 1, lines 21-28]. Suitable alkali cellulose can be prepared from pulverized cellulose and sodium hydroxide [column 1, lines 29-34]. Methyl chloride, allyl chloride, and ethylene oxide are among preferred etherifying agents [column 1, lines 46-60]. Alkali cellulose containing 1.2-5 moles of alkali can be reacted in one operation with 1.2-4.5 moles of ethylene oxide, 0.7-3 moles of methyl chloride and 0.45-2.0 moles of allyl halide [column 2, lines 28-33]. Etherification is performed at elevated temperature, preferably between 40-100°C, and gradually increasing temperatures may be applied, for a reaction period between about 1-10 hours [column 2, lines 45-59]. Organic solvents may be utilized to obtain a uniform reaction [column 2, lines 60-62]. After the reaction is complete, excess solvent or

etherification agent is drawn off and the product washed with hot water and dried in a dryer or by use of a vacuum. If the product is alkaline, it can be neutralized using acetic acid [column 2, line 67 - column 3, line 3].

Haidasch teaches the use of gradually increasing temperature but does not teach the stepwise elevation required by the instant claims. Haidasch uses pulverized cellulose for the etherification but is silent regarding the particle size and bulk density of the product.

Richter teaches that cellulose ethers of a powder not exceeding about 100 mesh are desirable [page 1, lines 12-17]. The particle size can be achieved by using a ball mill and screening to remove larger particles [page 1, lines 27-34]. Alternatively, the powdered cellulose ethers can be prepared by performing the pulverization to the desired degree of fineness before etherification at any stage of the process [page 2, lines 52-59].

Dannhorn teaches a process of making cellulose ethers wherein dimethyl ether is added after alkalinization. Amounts of dimethyl ether which may be used include as little as 67 g of dimethyl ether for 260 g of cellulose, which is about 0.25 parts by weight for 1 part of cellulose. Dannhorn also exemplifies a process using no dimethyl ether [0036-0037].

Anderson teaches that fibrous methyl cellulose may be obtained directly from an operation wherein methyl cellulose is made by etherification of alkali cellulose and washed with hot water [column 2, lines 51-55].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to carry out cellulose etherification using stepwise temperature elevation according to the processes taught by Onda or Haidasch, and including dimethyl ether or diethyl ether as a diluent gas in the amounts taught by Dunnhorn. Onda and Haidasch teach that gradual temperature elevation may be used, is "conventional," and which includes temperature ranges which overlap, or are very close to, the claimed ranges. Thus, the skilled artisan could use the guidance provided by Onda and Haidasch to carry out a conventional etherification which includes stepwise temperature elevation as recited in the instant claims. Onda's products are subjected to grinding after etherification to achieve the desired particle size of smaller than 100 mesh, and Haidasch is silent regarding the particle size of cellulose ethers prepared from pulverized cellulose (without grinding the final product). However, Richter teaches that the desired particle size may be achieved by pulverization of cellulose before etherification or after etherification. Thus, the skilled artisan could envision carrying out Onda's process wherein pulverized cellulose of the desired particle size is used as the starting material instead of grinding the product at the end of the process, and would expect to achieve products of the desired particle size. It has been held that merely reversing the order of steps in a multi-step process is not a patentable modification absent unexpected or unobvious results. Ex parte Rubin, 128 U.S.P.Q. 440 (P.O.B.A. 1959). Cohn v. Comr. Patents, 251 F. Supp. 437, 148 U.S.P.Q. 486 (D.C. 1966). Haidasch teaches that organic solvent may be used in the etherification reaction, but is silent regarding how much solvent should be used and which solvents are preferred.

However, Dunnhorn teaches various amounts of dimethyl ether which may be used in cellulose etherification, including an amount that overlaps with the claimed range. Thus, the skilled artisan could expect good results using Dunnhorn's teachings as guidance. Onda's products are described as fibrous before grinding and Haidasch is silent regarding whether the products obtained from pulverized cellulose are fibrous, but the skilled artisan would expect a fibrous product because Anderson teaches that fibrous cellulose ether products are obtained from an operation which includes washing in hot water, which is part of Onda's and Haidasch's processes.

Response to Arguments

Applicant's arguments and the declaration of Dr. Lee, Sang-Koo submitted December 18, 2009 have been fully considered but not found persuasive. Applicant argues that reversing the process steps as suggested in the office action would not be a routine modification because manufacturing processes starting with small particles suffer from the problem of flocculation/agglomeration. This argument is not persuasive because the prior art (Richter) teaches that powdered cellulose ethers can be prepared by performing the pulverization to the desired degree of fineness before etherification at any stage of the process. The skilled artisan would make this modification because the prior art explicitly suggests it.

Applicant's argument that the amounts of diluent gas in Table 1 of the specification are in kg, not parts by weight, is acknowledged. The examiner regrets the error.

Applicant argues that the state of the art is such that the skilled artisan would expect that the use of larger amounts of diluent gas would result in smaller particle size. Dr. Lee, Sang-koo's declaration shows that modification of Example 1 to include twice as much diluent gas results in a larger particle size. Thus, Applicant argues that the results are unexpected. However, Applicant has not provided any evidence that the state of the art is as stated by Applicant. Hitchen (of record) teaches that diluent gas will facilitate heat transfer and function as a vehicle for assisting penetration of the cellulose fibers by methyl chloride, but does not teach a correlation with particle size. Thus, it is not clear that the state of the art is such that the use of more diluent gas would be expected to produce a smaller particle size, so it is not clear that Applicant's result is unexpected. Note that arguments of counsel cannot take the place of factually supported objective evidence. See, e.g., In re Huang, 100 F.3d 135,139-40, 40 USPQ2d 1685, 1689 (Fed. Cir. 1996); In re De Blauwe, 736 F.2d 699, 705, 222 USPQ 191, 196 (Fed. Cir. 1984). The burden is shifted to Applicant to show factually supported objective evidence to rebut the prima facie case of obviousness over the prior art.

It is also noted that claim 21 does not recite any limitations to particle size or diluent gas. See MPEP 716.02(d): Whether the unexpected results are the result of unexpectedly improved results or a property not taught by the prior art, the "objective evidence of nonobviousness must be commensurate in scope with the claims which the evidence is offered to support." In other words, the showing the unexpected results must be reviewed to see if the results occur over the entire claimed range. In this case, claim 21 is not commensurate in scope with Applicant's data. Applicant argues that

using 0-0.25 parts by weight of diluent gas results in an unexpectedly small particle size. However, claim 21 is not limited to any particular amount of diluent gas and is drawn to production of cellulose ethers of any particle size. Thus, even if Applicant submits factually supported evidence to show the state of the art as discussed above, unexpected results based on diluent gas and particle size would not be sufficient to overcome the rejection of claim 21.

Conclusion

No claims are allowed.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAYLA BLAND whose telephone number is (571)272-9572. The examiner can normally be reached on Monday - Friday, 7:00 - 3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anna Jiang can be reached on (571) 272-0627. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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